

**Natural Resources Conservation Service**  
**ILLINOIS CONSERVATION PRACTICE STANDARD**

**FOREST STAND IMPROVEMENT**

(Acre)

**CODE 666**

**DEFINITION**

The manipulation of species composition, stand structure, and stocking by cutting or killing selected trees and understory vegetation.

**PURPOSES**

- To increase the quantity and quality of forest products, e.g., sawtimber, veneer, wood fiber, poles, pilings, maple syrup, naval stores, nuts and fruits.
- To harvest forest products.
- To initiate forest stand regeneration.
- To reduce the potential of damage from wildfire, pests, and moisture stress.
- To restore natural plant communities.
- To achieve a desired understory plant community.
- To improve aesthetic, recreation, and open space values.
- To improve wildlife habitat.
- To improve water conservation and yield.
- To achieve a desired level of crop tree stocking and density.
- To increase carbon storage in selected crop trees.

**CONDITIONS WHERE PRACTICE APPLIES**

On forestland where competing vegetation hinders development and stocking of preferred tree and/or understory species or where some of the stand will be cut or killed for intended purposes.

**CRITERIA**

***General Criteria Applicable to All Purposes***

The harvest-regeneration strategy will be identified for all planned forest improvement harvesting:

- Uneven-aged management systems (single-tree selection, group selection, coppice selection)
- Even-aged management (clear-cut, seed-tree, shelterwood, coppice)

Preferred tree and understory species are identified and retained to achieve all planned purposes.

Spacing, density, size class, number, and amounts of trees and understory species to be retained will follow established guidelines for the intended purposes.

Stocking guidelines shall contain stocking in terms of crop trees, basal area, and/or trees per acre by species and size class distribution. For detailed information on crop tree selection and management see Plans and Specifications.

The method, felling direction and timing of tree cutting for harvesting shall facilitate efficient and safe tree removal and protect sensitive areas such as wetlands, riparian zones, cultural resources, and structures.

Forest stand improvement activities shall be performed to minimize soil erosion, compaction, rutting, damage to remaining vegetation and hydrologic conditions. For more information see practice standard FOREST TRAILS AND LANDINGS (655).

Slash and debris left on the site after treatment will not present an unacceptable fire, safety, environmental, or pest hazard. Such remaining material will not interfere with the intended purpose or other management activities.

Comply with applicable federal, state and local laws and regulations during the installation, operation and maintenance of this practice. Appropriate cultural resources review will be conducted before beginning any practice that results in soil disturbance.

#### **Additional Criteria to Increase the Quantity and Quality of Forest Products**

For species to retain for timber production see “Recommended Silviculture and Management Practices for Illinois Hardwood Forest Types” in References.

Crop trees to retain will be dominant or codominant, at least 25 feet tall, have a full, healthy crown, seedling origin or stump sprout originating within 6 inches of the ground, no epicormic branches on the lower stem, not leaning, without narrow-angled or low forks and an expected longevity of at least 20 years.

Kill any vines growing on crop trees intended for timber production. See Controlling Undesirable Trees, Shrubs, and Vines in Your Woodland in References. Apply the “cut stump” technique to prevent vines from resprouting.

#### **Additional Criteria to Restore Natural Plant Communities**

For more information on restoration of natural communities see practice standards RESTORATION AND MANAGEMENT OF DECLINING HABITATS (643) and WETLAND RESTORATION (657) and References.

#### **Additional Criteria to Improve Aesthetic Recreation and Open Space Values**

Crop trees to retain will be species that produce attractive flowers and/or colorful foliage, healthy crowns, good fall color, visible from travel ways or waterways, expected to live 20 years or more, possessing unique form or bark characteristics, having historical significance, or of particular interest to the landowner.

For additional guidelines refer to RECREATION AREA IMPROVEMENT (562) and RECREATIONAL TRAIL AND WALKWAY (568).

#### **Additional Criteria to Improve Wildlife Habitat**

For tree and shrub species to retain see HEDGEROW PLANTING (422).

Crop trees to retain will be dominant or codominant, have a full, healthy crown, a mast (fruit, seed or nut utilized as food by wildlife) producer and/or possessing a cavity or the potential for developing a cavity.

Retain all vines as a food source for wildlife.

Retain or create at least 3 brush piles per acre with material produced during improvement work. Hinged, partially cut “living brushpiles” should be included to provide long-lasting shelter. Brush piles are most effective near habitat edges rather than in the interior of a forested tract. Brush piles will need to be protected by a temporary, raked firebreak if prescribed burning is planned.

Low intensity prescribed fires may be used to improve/increase green browse for wildlife. Refer to practice standard PRESCRIBED BURNING (338). A prescribed burn plan (Job Sheet 338-JS) will be prepared and implemented by individuals possessing the appropriate level of Job Approval Authority.

#### **CONSIDERATIONS**

Silvicultural objectives and harvest-regeneration strategies may change over time and may be limited by prior management.

Successful regeneration of desirable species is usually dependent upon timely application of forest stand improvement and other practices, e.g., PRESCRIBED BURNING (338), FOREST SITE PREPARATION (490), TREE/SHRUB ESTABLISHMENT (612), PRESCRIBED GRAZING (528A), and USE EXCLUSION (472).

The extent, timing, size of treatment area, or the intensity of the practice should be adjusted to minimize cumulative effects (onsite and offsite), e.g., hydrologic and stream alteration, habitat fragmentation, nutrient cycling, biodiversity and visual resources.

Potential landowner and operator liability should be assessed before forest stand improvement activities begin.

The practice should be timed to minimize disturbance of seasonal wildlife activities.

Consider wildlife food and cover needs when making modifications to forest composition and tree spacing.

Consider retention of selected dead and dying trees, including down material, to enhance wildlife habitat values.

Landowners should secure a written contract with any service provider that specifically describes the extent of activity, duration of activity, responsibilities of each party and amount and timing of payments for services provided.

Landowners planning to sell timber should: know the amount of timber to be sold through an inventory, receive sealed bids, obtain a signed contract with an Illinois licensed timber buyer, receive full payment before cutting begins, and supervise harvest operations. For further information and sample contracts see [Here's How to...Write an Iron-Clad Timber Sale Contract](#) in References.

Best results are often obtained by retaining the services of a professional forester to conduct forestry practices, particularly the sale of timber.

Consider environmental concerns such as threatened and endangered species and natural areas.

## PLANS AND SPECIFICATIONS

Specifications for applying this practice shall be prepared for each site and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan, or other acceptable documentation.

### *Selection and Management of Crop Trees*

Crop trees are individual trees selected according to criteria that is based on species, form, crown size and position and other physical characteristics. Crop tree selection criteria have been developed for specific purposes such as timber production, wildlife habitat, water quality

and aesthetics (see [Crop Tree Management in Eastern Hardwoods](#) in References).

Crop trees may be selected and released when a height of 25 feet or more or a diameter at breast height (dbh) of 4 inches is reached, which is usually at age 10 to 15 years. In most cases 50 to 75 crop trees will be released per acre. Landowner objectives and stand quality may result in as few as 5 to 20 crop trees released per acre, but never more than 100 trees per acre.

A crop tree inventory will provide an estimate of the number of crop trees and trees needing to be cut or killed per acre for planning purposes. Guidelines for conducting an inventory and completing a Crop Tree Tally Sheet can be found in [Crop Tree Management in Eastern Hardwoods](#) in References. Data collected should include species and dbh for both crop trees and trees to be killed or cut. For crop trees, record the criteria used for crop tree selection (e.g. timber, wildlife, water quality, and/or aesthetics).

After selecting and marking crop trees a "crown touching" release is performed by cutting or killing only those adjacent trees whose crowns touch the crown of the crop tree. It is not necessary to cut or kill trees that are overtopped by a crop tree, unless it is a large shade tolerant tree (sugar maple, basswood, beech) that may grow up into the crown of the crop tree.

In areas within a stand of trees where there are no suitable crop trees, do not cut any trees. In most cases crop trees will be at least 25 feet apart. Occasionally two crop trees may be left close to each other. Treat their crowns as a single crown and apply a crown-touching release.

Unwanted trees, shrubs and vines may be killed by any of the following means; cutting, girdling, frilling, stem injection, or basal bark spray. Foliar sprays can be used for small trees. For specific information about techniques for killing trees, including recommend herbicides, see [Controlling Undesirable Trees, Shrubs, and Vines in Your Woodland](#) in References.

In some instances, enough trees of suitable size may be cut to warrant a commercial timber sale.

#### *Harvesting Timber to Improve Forestlands*

Forestland may be in need of improvement due to past management practices such as improper grazing, poor cutting practices (high-grading), wildfire or a combination of the above. Many unmanaged forest stands become overstocked with shade tolerant tree species (sugar maple and/or American beech) or shrub species (pawpaw, honeysuckle, buckthorn), preventing regeneration of more desirable light demanding species. Often the best way to improve a forest stand is to selectively harvest some timber focusing on the removal of less desirable trees. Creating openings in the forest canopy will result in natural regeneration of desired tree species. Size of openings may range from one-half acre to about 5 acres in size. For detailed information on harvesting timber to improve and regenerate forestlands see Recommended Silviculture and Management Practices for Illinois Hardwood Forest Types in References.

### **OPERATION AND MAINTENANCE**

Periodic inspections during treatment activities are necessary to ensure that objectives are achieved and resource damage is minimized. Follow-up and ongoing management activities will be needed to obtain desired results. See Recommended Silviculture and Management Practices for Illinois Hardwood Forest Types in References.

Crop tree release or forest stand improvement cutting may be repeated at 5 to 15 year intervals depending on site type and site quality. See Recommended Silviculture and Management Practices for Illinois Hardwood Forest Types in References.

### **REFERENCES**

Controlling Undesirable Trees, Shrubs and Vines in your Woodland. Ohio St. Univ. Exten. Pub. F-45. <http://ohioline.osu.edu/for-fact/0045.html>

Crop Tree Management: A Tool to Help You Achieve Your Woodland Goals. Ohio St. Univ. Exten. Pub. F-50-02, 2002. <http://ohioline.osu.edu/for-fact/0050.html>

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